

BY COURTESY OF (1), 2) THE DELAWARE AND HUDSON RAILROAD CORPORATION, (3) THE SENECA VALLEY RAILROAD, (4) THE ATCHAFALYA, (5) THE UNION PACIFIC, (6) THE BALTIMORE & OHIO RAILROAD, (7) THE KANSAS CITY SOUTHERN RAILWAY COMPANY, (8) THE SOUTHERN PACIFIC LINES

AMERICAN STEAM LOCOMOTIVES—HEAVY FREIGHT TYPES

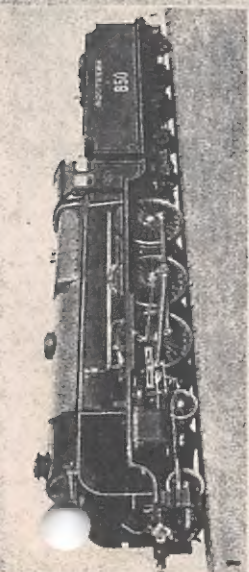
1. Consolidation, 2-8-0 type. Fast heavy freight service; fuel, anthracite and bituminous coal mixed; tractive effort, simple 84,300 lbs.; compound 70,300 lbs.; additional for tender truck booster 18,000 lbs.; boiler pressure 500 lbs.; cylinders, 2 multiple expansion, 1 high-pressure, 1 low-pressure; drivers 63"; weight on drivers 300,000 lbs.; total weight engine ex. tender 356,000 lbs.
2. Twelve-wheel 4-8-0 type. Fast heavy freight service; fuel, anthracite and bituminous coal mixed; tractive effort, simple 90,000 lbs.; triple expansion 75,000 lbs.; additional for tender truck booster 18,000 lbs.; boiler pressure 500 lbs.; cylinders, 4 triple expansion, 1 intermediate pressure, 2 low-pressure; poppet valves and outside cam pressure, 1 intermediate pressure, 2 low-pressure; weight on drivers 313,000 lbs.; total weight engine ex. tender 382,000 lbs.
3. Sixteen-wheel 4-8-4 type. Passenger and fast freight service; fuel, bituminous coal; tractive effort 66,500 lbs.; boiler pressure 275 lbs.; cylinders, 2 single expansion; drivers 77"; weight on drivers 272,200 lbs.; total weight engine ex. tender 435,000 lbs.
4. Twenty-two wheel 4-8-8-2 type. Passenger and freight service, fuel, fuel oil; tractive effort 349,910 lbs.; total weight engine ex. tender 502,260 lbs.
5. Eighteen-wheel 4-12-2 type. Freight service; fuel, bituminous coal; tractive effort 96,650 lbs.; boiler pressure 220 lbs.; cylinders, 3 single expansion; drivers 67"; weight on drivers 372,000 lbs.; total weight engine ex. tender 515,000 lbs.
6. Sixteen-wheel Mallet 2-6-6-2 type. Freight service; fuel, bituminous coal; tractive effort 90,000 lbs.; boiler pressure 250 lbs.; cylinders, 4 single expansion; drivers 70"; weight on drivers 372,000 lbs.; total weight engine ex. tender 465,000 lbs.
7. Eighteen-wheel Mallet 2-8-8-0 type. Heavy freight service; fuel, powdered bituminous coal and lignite, and fuel oil; tractive effort, simple 147,220 lbs., compound 122,683 lbs.; boiler pressure 250 lbs.; firebox type superheater; cylinders, multiple expansion, 2 high-pressure 2 low-pressure; drivers 57"; weight on drivers 466,000 lbs.; total weight engine ex. tender 495,000 lbs.
8. Twenty-two wheel 4-8-8-2 type. Passenger and freight service, fuel, fuel oil; tractive effort



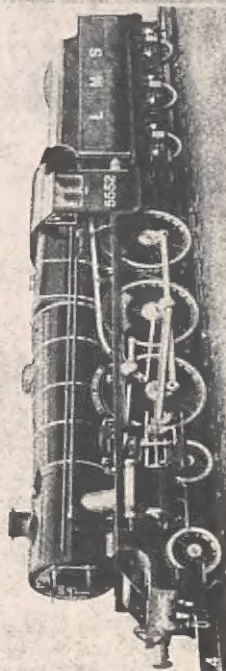
1



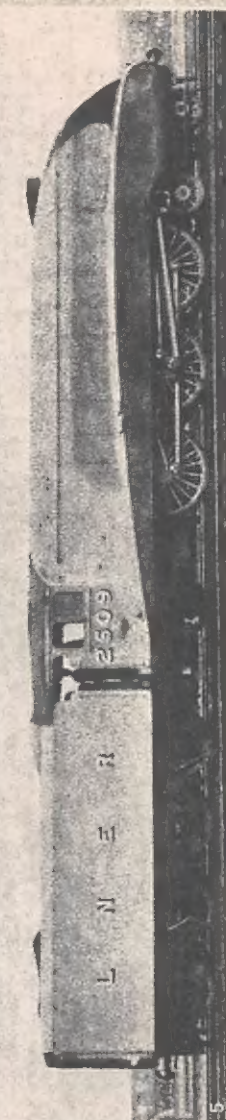
2



3



4



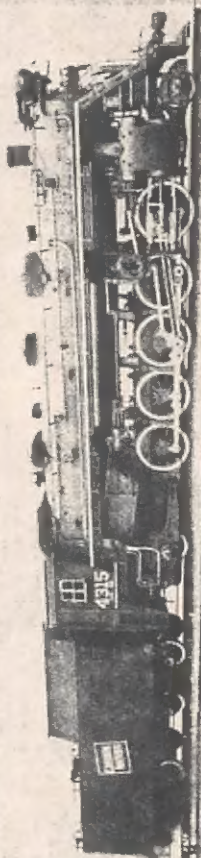
5



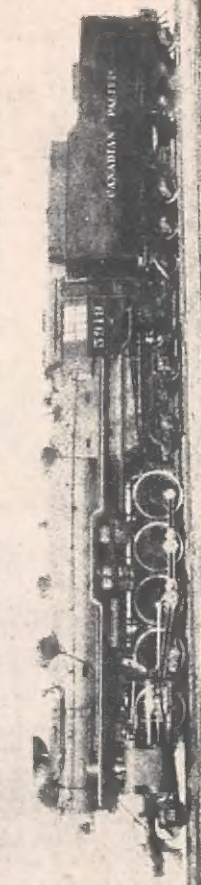
6



7



8



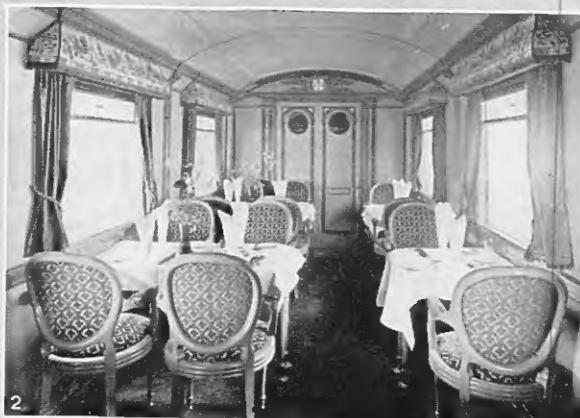
9

BY COURTESY OF: (1) THE SOUTHERN RAILWAY, (2, 3) BALTIMORE & OHIO RAILROAD COMPANY, (4) THE LONDON, MIDLAND AND SCOTTISH RAILWAY, (5) THE DELAWARE & HUDSON RY. CO. CORPORATION, (7) THE PENNSYLVANIA RAILROAD, (8) THE CANADIAN NATIONAL RAILWAYS, (9) THE CANADIAN PACIFIC RAILWAY COMPANY

BRITISH AND AMERICAN TYPES OF STEAM LOCOMOTIVES FOR PASSENGER AND FREIGHT SERVICE

1. Lord Nelson 4-6-0 type. Fast passenger service; fuel, anthracite and bituminous coal mixed; tractive effort 59,500 lbs.; boiler pressure 325 lbs.; cylinders, 2 single expansion; poppet valves and outside rotary cam valve gear; drivers 73"; weight on drivers 191,000 lbs.; total weight of engine ex. tender 296,500 lbs. 7. Fourteen-wheel 4-8-2 type. Fast freight and passenger service; fuel, bituminous coal; tractive effort 64,550 lbs.; boiler pressure 250 lbs.; cylinders, 2 single expansion; drivers 72"; weight on drivers, 271,000 lbs.; total weight engine ex. tender 390,000 lbs. 8. Fourteen-wheel 2-10-2 type. Heavy freight service; fuel, bituminous coal; tractive effort 61,600 lbs.; boiler pressure 275 lbs.; cylinders, 2 single expansion; drivers 57"; weight on drivers 261,040 lbs.; total weight engine ex. tender 344,170 lbs. 9. Sixteen-wheel, 2-10-4 type. Heavy freight service; fuel, bituminous coal; tractive effort 77,200 lbs.; boiler pressure 275 lbs.; cylinders, 2 single expansion; drivers 63"; weight on drivers 312,800 lbs.; total weight engine ex. tender 452,000 lbs.

2. Lord Baltimore, Pacific 4-6-4 type. Fast passenger service; fuel, soft coal; tractive effort 34,000 lbs.; boiler pressure, 350 lbs.; cylinders, 19 in. diameter, 28 in. stroke; drivers 84"; weight on drivers 156,000 lbs.; total weight engine ex. tender 294,000 lbs. 3. Lady Baltimore, Atlantic 4-4-4 type. Fast passenger service; fuel, soft coal; tractive effort 35,000 lbs.; boiler pressure, 350 lbs.; cylinders 17 1/2 in. diameter, 28 in. stroke; drivers 84"; weight on drivers 99,800 lbs.; total weight engine ex. tender 217,800 lbs. 4. Silver Jubilee 4-6-0 type. Fuel, bituminous coal; boiler working pressure 225 lbs. per sq. in.; three cylinders 17" dia. x 26" stroke; tractive effort at 85% B.P. 26,610 lbs.; weight ex. tender (light) 168,784 lbs. 5. Silver Link 4-6-2 three-cylinder engine, type A-4. Fuel, coal; boiler pressure 250 lbs.; cylinders, 18 1/2 in. diam., 26 in. stroke; driving wheel 6 ft. 8 in.; tractive power at 85% boiler pressure 35,455 lbs.; weight of engine and tender 165 tons 7 cwt. 6. Pacific 4-6-2 type. Fast



BY COURTESY OF (1, 3, 5) THE GERMAN TOURIST INFORMATION BUREAU, (2) LONDON AND NORTH EASTERN RAILWAY, (4) THE INTERNATIONAL WAGON-LITS COMPANY, (6, 10, 11, 12) THE UNION PACIFIC RAILROAD, (7, 8, 9) THE PULLMAN COMPANY

RAILROAD PASSENGER ACCOMMODATIONS

1. Corridor of a German express train, showing private compartments
2. Interior of a first-class dining car, London and North Eastern Railway
3. A first-class compartment on a German express train
4. A salon on an International Wagon-Lits Company train, France
5. A private compartment on a German express
6. Cozy comfort in a streamlined American Pullman
7. Observation end of lounge in an American Pullman train
8. Stateroom on Pullman overnight car, showing fixed bed, and individual toilet facilities
9. Standard Pullman sleeping car with semi-private compartments
10. Sleeping compartment on streamlined train
11. The dining section on a streamlined train
12. Novel buffet for meal service



1



2



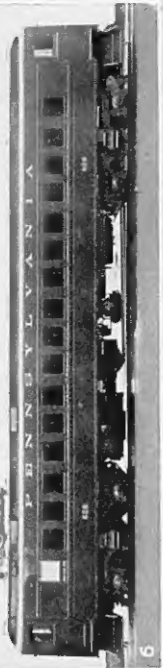
3



4



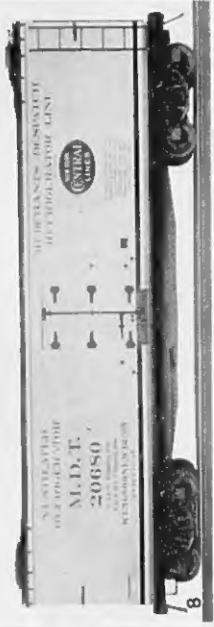
5



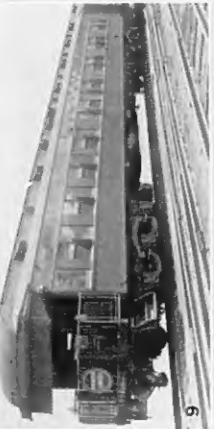
6



7



8



9



10



11



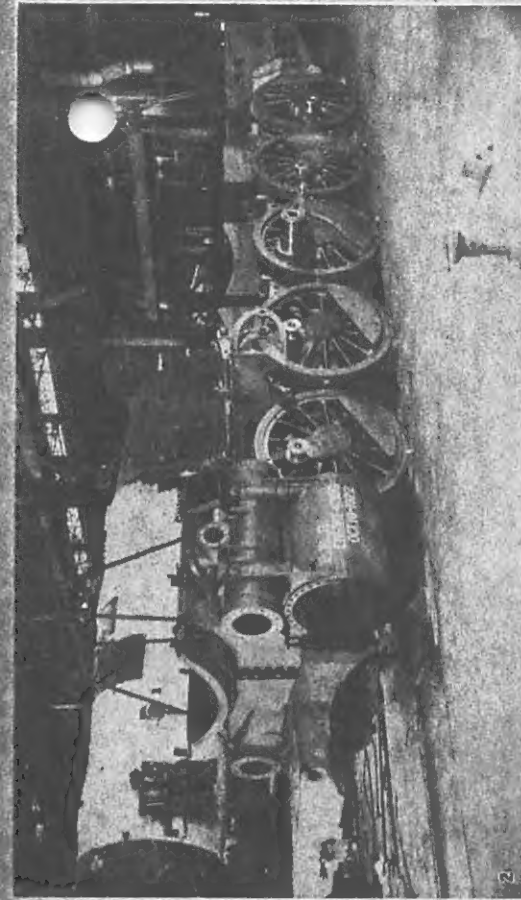
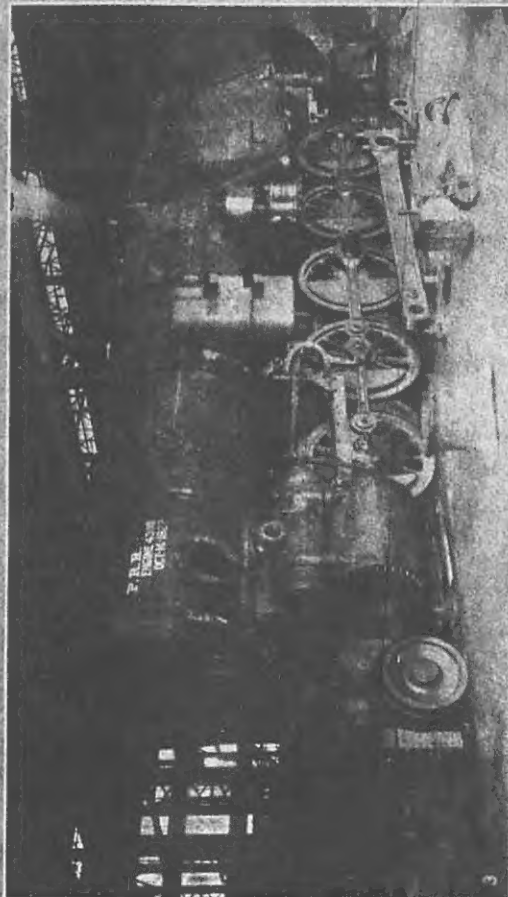
12

BY COURTESY OF (1) THE VIRGINIAN RAILWAY AND PRESSED STEEL CAR COMPANY, (2, 4, 6, 10) THE PENNSYLVANIA RAILROAD COMPANY, (3) THE AMERICAN CAR AND FOUNDRY COMPANY, (5, 7, 8) THE NEW YORK CENTRAL LINES, (9) THE CHICAGO, MILWAUKEE, ST. PAUL AND PACIFIC RAILROAD COMPANY, (11) THE TIMKEN ROLLER BEARING COMPANY, (12) THE INTERNATIONAL WAGON-LITS COMPANY

VARIOUS TYPES OF ROLLING STOCK

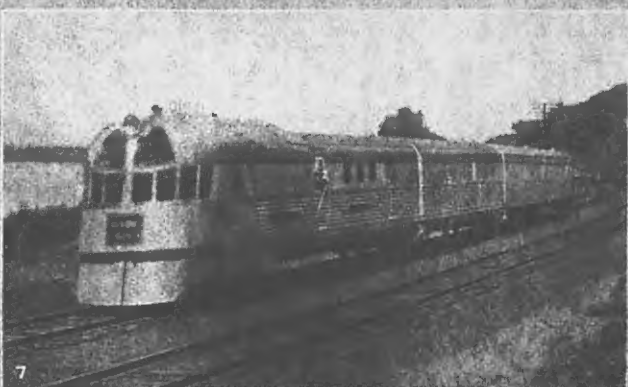
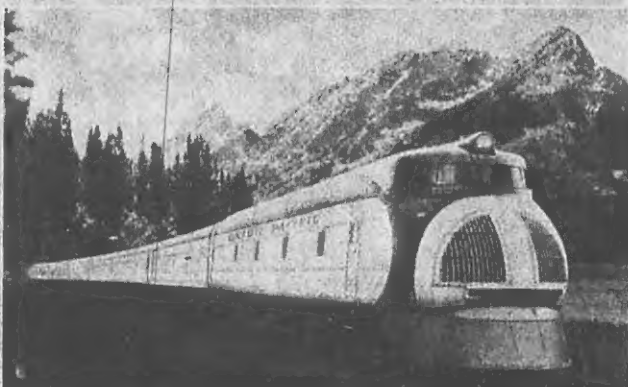
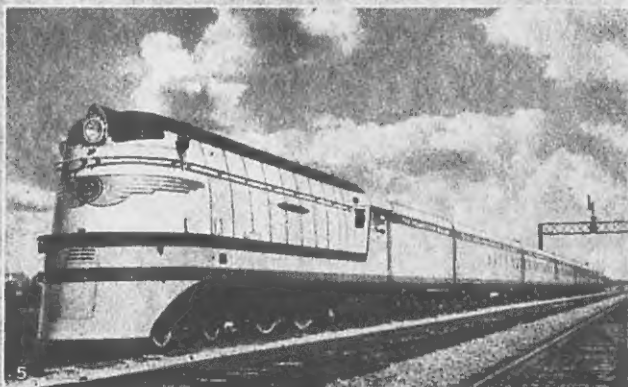
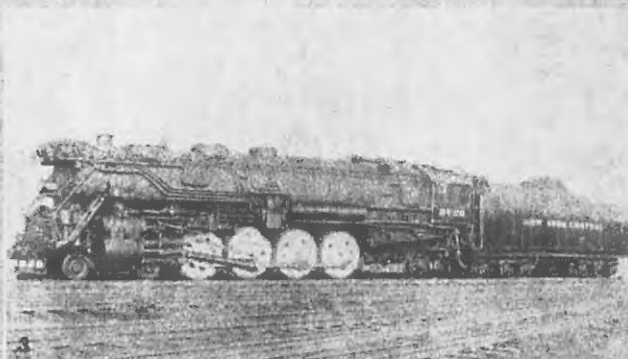
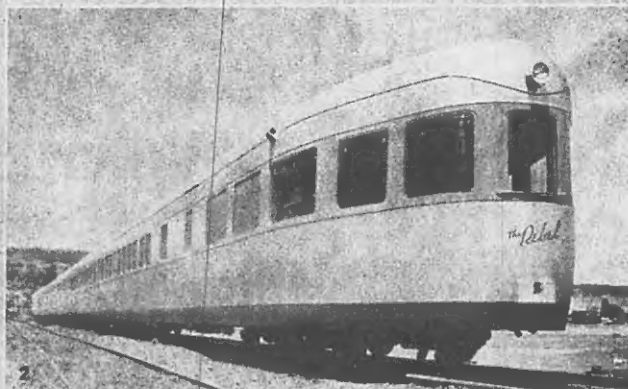
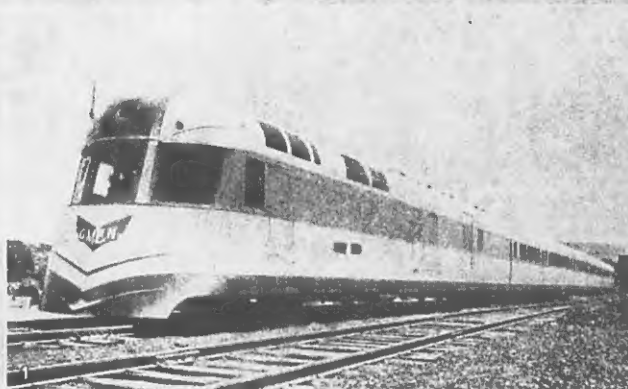
1. All steel, 120 ton, solid bottom gondola exemplifying modern construction. 2. Hopper coal car, 140,000 pounds capacity. 3. Railway tank car for transporting liquid chlorine. Safety release valves provide against excess pressure. 4. Double-sheathed steel, 50-ton, automobile box car. 5. Double-deck, 40-ton, live stock car. 6. Multiple unit electric car, all-steel construction. 7. Special flat car. 8. Ventilated 35-ton, refrigerator car, used extensively for protecting commodities, such as meat, milk, fruit and vegetables against changes of temperature. 9. The 'Pioneer Limited' of the Chicago, Milwaukee

St. Paul and Pacific Railroad, the first completely roller bearing equipped Pullman train in the history of American railroads. 10. Pennsylvania Railroad's streamlined coal-burning steam locomotive hauling passenger train. 11. One of the first container cars in America, enabling the transference of portable containers directly from motor truck to car, conveniently and without loss of time. 12. Modernly equipped French Pullman train, of the International Wagon-Lits Company



ERECTING A PENNSYLVANIA DECAPOD (TEN-DRIVING-WHEEL) TYPE LOCOMOTIVE

1. Frames and crossies assembled and mounted on the erecting forms.
2. View showing the five pairs of driving wheels assembled to the frame, and the cylinders being lowered into position by means of the crane
3. The boiler in place, preparatory to the application of heat-insulating asbestos lagging. The valve motion mechanisms and side rods are being affixed to the wheels and cylinder
4. The completed locomotive, showing sheet steel outer jacket, and all appurtenances applied

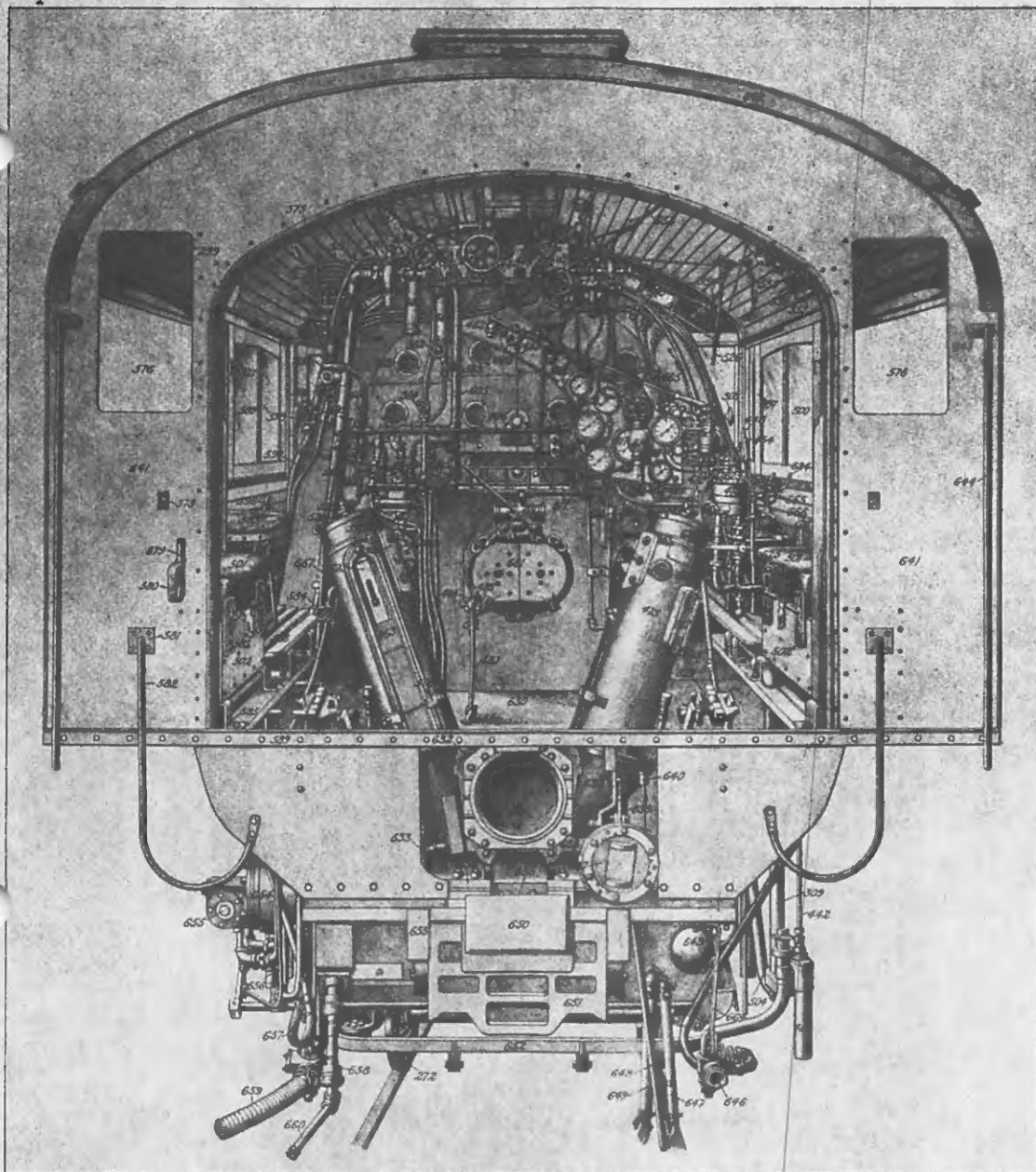


BY COURTESY OF (1), (2) THE AMERICAN CAR AND FOUNDRY CO., (3) THE NEW YORK CENTRAL LINES, (4) THE RAILWAYS OF FRANCE, (5) THE MILWAUKEE ROAD, (6) THE UNION PACIFIC, (7) THE CHICAGO, BURLINGTON & QUINCY R. R., (8) NEW YORK CENTRAL LINES

MODERN LOCOMOTIVES AND TRAINS

1. "The Rebel," streamlined train designed and built by American Car and Foundry Co. for Gulf, Mobile and Northern Railroad. 2. Rear view showing observation end of "The Rebel," first streamlined train for the South. 3. Freight locomotive with new type dies driving wheels. 4. Streamlined unit of the "Bugatti" type, operated on the French State Railways. 5. "The Hiawatha" in service between Chicago, Milwaukee, St.

Paul and Minneapolis. 6. "The City of Portland," Union Pacific streamliner. 7. First streamlined "Zephyr" of the Chicago, Burlington & Quincy. 8. "The Twentieth Century Limited," drawn by a Hudson type steam locomotive with 4700 horse power, in operation between New York city and Chicago



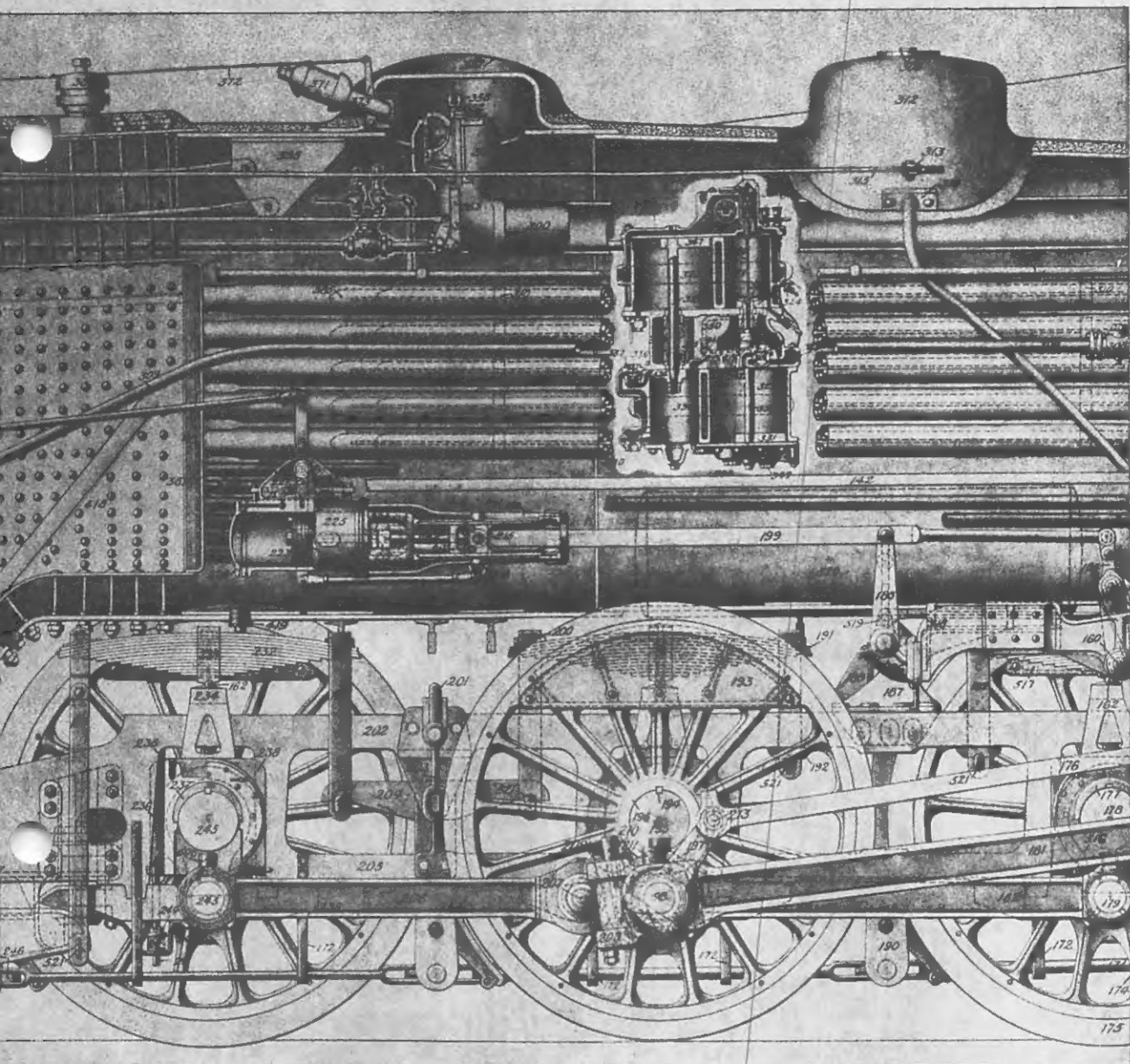
BY COURTESY OF THE ANGUS SINCLAIR COMPANY

PACIFIC OR 4-6-2 TYPE LOCOMOTIVE—FORWARD VIEW

2. Tralling truck details. 299. Bell lever and bell cord. 309. Delivery pipe. 412. Sellers U.S. standard non-lifting injector line check. 417. Steam gauge. 422. Sellers U.S. standard non-lifting injector details. 448-449 Ragonnet power reverse gear details. 454. Ragonnet power reverse gear details. 458. Cab ventilator. 461. Cab eaves trough. 463. Throttle stem stuffing box gland. 465. Throttle lever. 471. Westinghouse independent brake valve body. 472. Westinghouse engineer's valve handle. 473. Westinghouse engineer's valve top case. 475. Duplex stoker elevator casing. 481. Franklin fire door opener handle. 484. Franklin fire door opener hanger bolt. 485. Franklin fire door opener tread hanger adjusting gear. 486-487. Franklin fire door opener tread hanger. 497. Cab window, sash, frame and guides. 500. Cab window, sash, frame and guides. 501-502. Cab seat and box. 503. Sand rod handle. 504. Steam pipe to injector. 505. Side sheet of fire box. 526. Whistle lever rod. 534. Left injector steam valve handle. 535. Flange lubricator steam valve handle. 536. Car heating valve handle. 537. Main fountain valve handle. 538. Coal pusher valve handle at turret. 539. Ragonnet reverse gear valve handle. 540. Right injector steam valve handle. 541. Main steam valve handle from turret to stoker. 542. Air pump steam valve handle. 543. Head-light turbine steam valve handle. 544. Main lubricator steam valve handle. 545. Cab heater turret steam valve handle. 546. Grate shaker steam valve handle. 547. Main power valve handle. 548. Reducing valve for steam heat. 549. Car heat steam pipe. 550. Steam coil for flange lubricator. 551. Sight feed flange lubricator. 552. Sight feed stoker lubricator. 553. Cab brace. 554-555. Whistle rod and cord. 556-557. Pyle National head-light switch and bumper. 558. Gauge bracket. 559. Lubricator light. 560. Water glass lamp. 561. Water glass. 562-563. Water glass shut off valve and drip pipe valve. 564. Main steam pipe valve. 565. Washout plug for crown sheet. 566. Left blower valve. 567. Cab heater valve. 568. Stoker valve. 569. Coal pusher valve. 570-571. Coal pusher pipe valve and pusher valve. 572. Grate shaker handles. 573. Grate shaker oil cup. 574. Water gauge funnel. 575. Cab opening stiffening angle. 576. Back cab window opening. 577-578. Cab window hook and gangway chain hook. 579. Bar for cab handhold. 580-582. Cab handhold and grabiron. 583. Cab drop seat. 584. Sprinkling hose valve. 585-586. Seat-step and foot-rest. 587. Seat box hasp. 588. Grate shaker lever. 589. Bottom cab stiffening plate. 590. Oil pipe to duplex stoker driving rack. 591-595. Duplex mechanical stoker details. 596. Blow-off cock lever. 597. Blower pipe. 598. Injector operating valve lever. 599-600. Duplex stoker operating rod bearing and handles. 601. Lubricator pipe to steam cylinder. 602. Lubricator pipe to steam cylinder of air pump. 603. Steam valve Pyle National head-light turbine. 604. Steam valve for Ragonnet reverse gear. 605. Coal pusher steam pipe. 606. Duplex stoker operating rod. 607. Steam gauge Pyle National head-light turbine. 608. Steam gauge for flange lubricator. 609. Pyrometer gauge. 610-611. Large and small duplex air gauges. 612-613. Car and cab heater gauges. 614. Steam gauge lamp. 615. Oil can rack. 616. Duplex stoker conveyor oil cup. 617. Oil can shelf. 618. Train line gauge pipe. 619. Brake cylinder gauge pipe. 620. Release valve for brakes. 621. Brake application pipe. 622. Distributing valve release pipe. 623. Main reservoir pipe. 624. Sander valve handle. 624a. Train line pipe cut-out cock handle. 625. Train line pipe cut-out cock. 626. Equalizing reservoir pipe. 627. Duplex stoker elevator casing door. 628. Drain pipe for gauge cock funnel. 629. Grate shaker. 630. Footplate. 631-640. Duplex mechanical stoker details. 641-642. Cab wall and hood. 643. Double-heading cock. 643a. Equalizing reservoir. 644. Cab handhold. 645. Cab handhold crowfoot. 646. Feed water suction pipe valve. 647. Air signal hose. 648. Gauge cock drip pipe. 649. Air brake hose. 650. Back buffer plate. 651. Left safety bar casting. 652. End piece of tralling truck. 653. Engine frame. 654-655. Duplex stoker cylinder and steam chest. 656. Left injector. 657. Blow-off pipe. 658. McLaughlin flexible conduit. 659. Suction hose. 660. Steam-heater pipe. 661. Franklin fire door. 662. Duplex stoker peep hole. 663. Duplex stoker elevator casing slide guide. 664. Feed water suction pipe valve bracket. 665. Sander valve. 666. Driver brake cylinder cut-out cock. 667. Duplex stoker reach rod



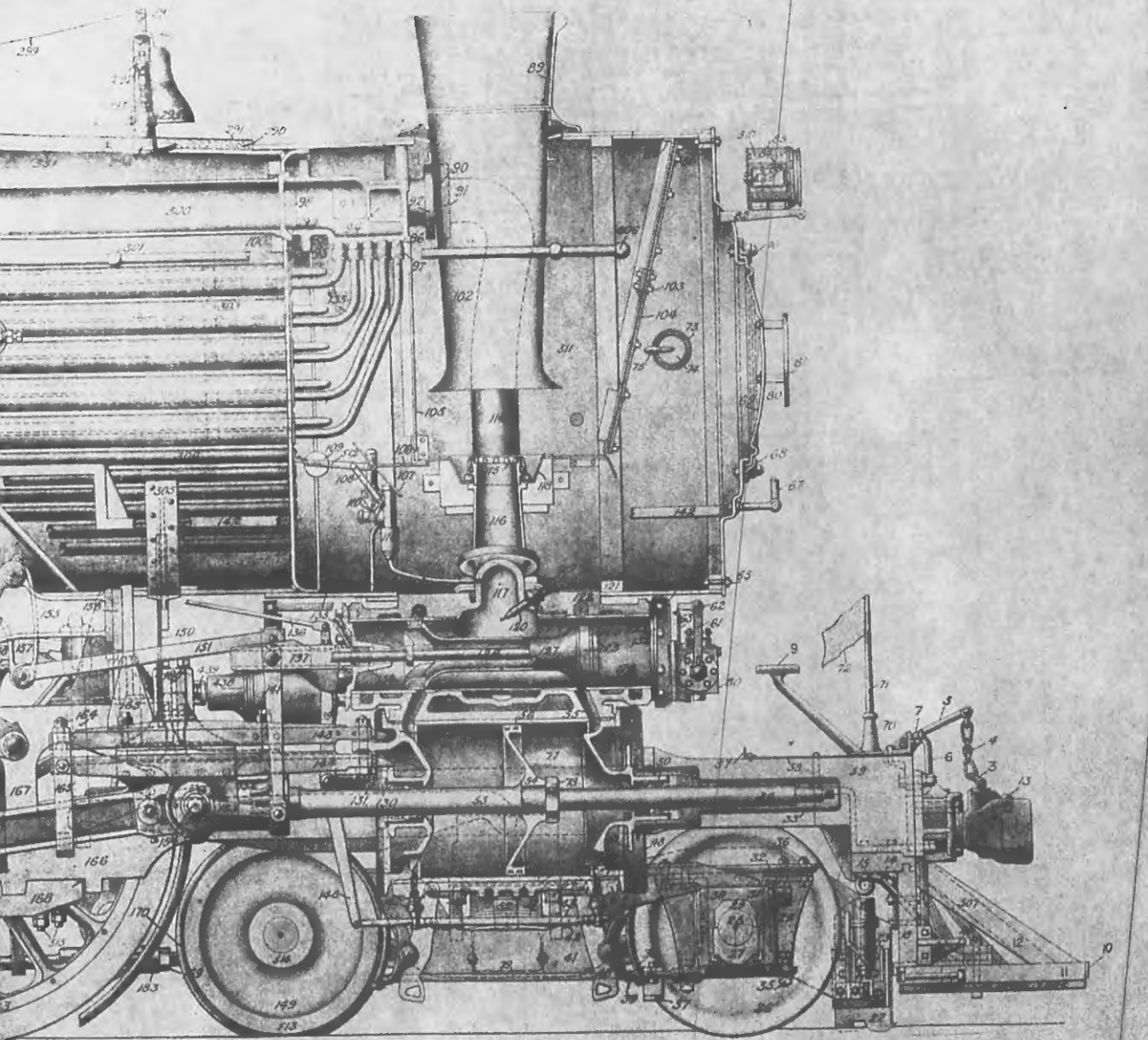
245. Driver brake lever. 249-250. Foundation ring bearing shoe and support. 251. Emission plate. 252. Ashpan casing. 253. Operating lever for ashpan door. 254. Operating lever for ashpan door. 255. Lifting arm front hopper ashpan door. 256. Swinging lever front hopper ashpan door. 257. Bell crank arm for rear hopper ashpan door. 258. Bell crank arm for front hopper ashpan door. 259. Connecting link front ashpan hopper door rigging. 260. Lower arm swinging lever ashpan hopper door. 261. Front hopper casting for ashpan. 262. Connecting link rear ashpan hopper door rigging. 263. Rear hopper ashpan door. 264. Lifting bar rear ashpan hopper door. 265. Swinging lever rear hopper ashpan door. 266. Trailing truck and driving equalizer. 267. Rear ashpan door. 268. Equalizer fulcrum ball. 269. Equalizer fulcrum socket bracket. 270-277. Trailing truck details. 278-279. Trailing truck bracket shoe and bracket. 280-283. Trailing truck brake cylinder and air pipe. 282. Rear section of engine frame. 283. Footplate. 284. Drawbar pin. 285-287. Keeper key, keeper arm and head. 288. Unit safety bar. 289. Bell lever and bell cord. 315. Sand box rod. 390. Ragonet reverse gear reach rod. 396-397. Tate flexible stay bolt and sleeve. 398. Tate flexible stay bolt. 399-400. Sellers fountain valve and fountain. 401. Injector steam pipe. 402-403. Sellers U.S. standard non-lifting injector details. 404-405. Steam turret and valve. 406. Sellers U.S. standard non-lifting injector hand pull. 407. Boiler bracket for injector hand pull. 408-429. Dumping grate crank arm and connecting bar. 430. Dumping grate lever. 431. Dumping grate. 432-437. Grate finger and grate trunnion. 434-435. Grate arm. 436. Back grate shaking bar. 437. Grate shaking rod. 440. Ashpan frame. 441. Foundation ring. 442-447. Sellers U.S. standard non-lifting injector details. 448-454. Ragonet power reverse gear details. 455. Door opening. 456. Back boiler head. 457. Stiffening plate for boiler. 458. Cab ventilator. 459. Whistle bell crank. 460. Cab roof. 461. Cab eaves trough. 462. Throttle fulcrum. 463. Throttle stem stuffing box gland. 464. Throttle stem. 465. Throttle lever. 466-467. Throttle lever quadrant and latch handle. 468. Throttle stem stuffing box. 469. Steam gauge. 470. Steam gauge. 471. Westinghouse independent brake valve handle. 471. Westinghouse independent brake valve handle. 472. Westinghouse engineer's valve handle. 473. Westinghouse independent brake valve handle. 474. Brake pipe. 475. Duplex stoker elevator casing. 476. Franklin butterfly fire door. 477. Franklin fire door. 478. Duplex stoker steam jet nozzle. 479-480. Franklin fire door opener gear casing and cylinder. 481. Franklin fire door opener hand lever. 482. Duplex stoker elevator drive and reverse casing. 483. Duplex stoker operating handle. 484. Franklin fire door opener gear casing and cylinder. 485. Franklin fire door opener hanger adjusting gear. 486-487. Franklin fire door opener tread and hanger. 488. Duplex stoker conveyor drive and reverse gear. 489. Duplex stoker adjusting gear. 490-491. Duplex stoker engine cylinder head and frame. 492. Duplex stoker supporting leg or cradle casting. 493. Duplex stoker valve rod to engine. 494-495. Duplex stoker engine cylinder head and frame. 496-500. Cab window, ash, frame and housing. 501-502. Cab seat and box. 503. Sand rod handle. 504. Steam pipes to injector. 505. Side sheet of fire box. 508-509. Top and bottom trailing guides. 509-510. Cab seat and box. 511. Duplex stoker distributor tube. 512. Duplex stoker distributor tube. 513. Duplex stoker distributor tube. 514. Duplex stoker distributor tube. 515. Duplex stoker distributor tube. 516. Duplex stoker distributor tube. 517. Duplex stoker distributor tube. 518. Duplex stoker distributor tube. 519. Duplex stoker distributor tube. 520. Duplex stoker distributor tube. 521. Duplex stoker distributor tube. 522. Duplex stoker distributor tube. 523. Duplex stoker distributor tube. 524. Duplex stoker distributor tube. 525. Duplex stoker distributor tube. 526. Whistle lever rod. 528-529. Duplex stoker elevator shifter and shaft. 530. Duplex stoker elevator shifter and shaft. 531. Duplex stoker distributor tube. 532. Duplex stoker distributor tube. 533. Duplex stoker distributor tube. 534. Duplex stoker distributor tube. 535. Duplex stoker distributor tube. 536. Duplex stoker distributor tube. 537. Duplex stoker distributor tube. 538. Duplex stoker distributor tube. 539. Duplex stoker distributor tube. 540. Duplex stoker distributor tube. 541. Duplex stoker distributor tube. 542. Duplex stoker distributor tube. 543. Duplex stoker distributor tube. 544. Duplex stoker distributor tube. 545. Duplex stoker distributor tube. 546. Duplex stoker distributor tube. 547. Duplex stoker distributor tube. 548. Duplex stoker distributor tube. 549. Duplex stoker distributor tube. 550. Duplex stoker distributor tube. 551. Duplex stoker distributor tube. 552. Duplex stoker distributor tube. 553. Duplex stoker distributor tube. 554. Duplex stoker distributor tube. 555. Duplex stoker distributor tube. 556. Duplex stoker distributor tube. 557. Duplex stoker distributor tube. 558. Duplex stoker distributor tube. 559. Duplex stoker distributor tube. 560. Duplex stoker distributor tube. 561. Duplex stoker distributor tube. 562. Duplex stoker distributor tube. 563. Duplex stoker distributor tube. 564. Duplex stoker distributor tube. 565. Duplex stoker distributor tube. 566. Duplex stoker distributor tube. 567. Duplex stoker distributor tube. 568. Duplex stoker distributor tube. 569. Duplex stoker distributor tube. 570. Duplex stoker distributor tube. 571. Duplex stoker distributor tube. 572. Duplex stoker distributor tube. 573. Duplex stoker distributor tube. 574. Duplex stoker distributor tube. 575. Duplex stoker distributor tube. 576. Duplex stoker distributor tube. 577. Duplex stoker distributor tube. 578. Duplex stoker distributor tube. 579. Duplex stoker distributor tube. 580. Duplex stoker distributor tube. 581. Duplex stoker distributor tube. 582. Duplex stoker distributor tube. 583. Duplex stoker distributor tube. 584. Duplex stoker distributor tube. 585. Duplex stoker distributor tube. 586. Duplex stoker distributor tube. 587. Duplex stoker distributor tube. 588. Duplex stoker distributor tube. 589. Duplex stoker distributor tube. 590. Duplex stoker distributor tube. 591. Duplex stoker distributor tube. 592. Duplex stoker distributor tube. 593. Duplex stoker distributor tube. 594. Duplex stoker distributor tube. 595. Duplex stoker distributor tube. 596. Duplex stoker distributor tube. 597. Duplex stoker distributor tube. 598. Duplex stoker distributor tube. 599. Duplex stoker distributor tube. 600. Duplex stoker distributor tube. 601. Duplex stoker distributor tube. 602. Duplex stoker distributor tube. 603. Duplex stoker distributor tube. 604. Duplex stoker distributor tube. 605. Duplex stoker distributor tube. 606. Duplex stoker distributor tube. 607. Duplex stoker distributor tube. 608. Duplex stoker distributor tube. 609. Duplex stoker distributor tube. 610. Duplex stoker distributor tube. 611. Duplex stoker distributor tube. 612. Duplex stoker distributor tube. 613. Duplex stoker distributor tube. 614. Duplex stoker distributor tube. 615. Duplex stoker distributor tube. 616. Duplex stoker distributor tube. 617. Duplex stoker distributor tube. 618. Duplex stoker distributor tube. 619. Duplex stoker distributor tube. 620. Duplex stoker distributor tube. 621. Duplex stoker distributor tube. 622. Duplex stoker distributor tube. 623. Duplex stoker distributor tube. 624. Duplex stoker distributor tube. 625. Duplex stoker distributor tube. 626. Duplex stoker distributor tube. 627. Duplex stoker distributor tube. 628. Duplex stoker distributor tube. 629. Duplex stoker distributor tube. 630. Duplex stoker distributor tube. 631. Duplex stoker distributor tube. 632. Duplex stoker distributor tube. 633. Duplex stoker distributor tube. 634. Duplex stoker distributor tube. 635. Duplex stoker distributor tube. 636. Duplex stoker distributor tube. 637. Duplex stoker distributor tube. 638. Duplex stoker distributor tube. 639. Duplex stoker distributor tube. 640. Duplex stoker distributor tube. 641. Duplex stoker distributor tube. 642. Duplex stoker distributor tube. 643. Duplex stoker distributor tube. 644. Duplex stoker distributor tube. 645. Duplex stoker distributor tube. 646. Duplex stoker distributor tube. 647. Duplex stoker distributor tube. 648. Duplex stoker distributor tube. 649. Duplex stoker distributor tube. 650. Duplex stoker distributor tube. 651. Duplex stoker distributor tube. 652. Duplex stoker distributor tube. 653. Duplex stoker distributor tube. 654. Duplex stoker distributor tube. 655. Duplex stoker distributor tube. 656. Duplex stoker distributor tube. 657. Duplex stoker distributor tube. 658. Duplex stoker distributor tube. 659. Duplex stoker distributor tube. 660. Duplex stoker distributor tube. 661. Duplex stoker distributor tube. 662. Duplex stoker distributor tube. 663. Duplex stoker distributor tube. 664. Duplex stoker distributor tube. 665. Duplex stoker distributor tube. 666. Duplex stoker distributor tube. 667. Duplex stoker distributor tube. 668. Duplex stoker distributor tube. 669. Duplex stoker distributor tube. 670. Duplex stoker distributor tube. 671. Duplex stoker distributor tube. 672. Duplex stoker distributor tube. 673. Duplex stoker distributor tube. 674. Duplex stoker distributor tube. 675. Duplex stoker distributor tube. 676. Duplex stoker distributor tube. 677. Duplex stoker distributor tube. 678. Duplex stoker distributor tube. 679. Duplex stoker distributor tube. 680. Duplex stoker distributor tube. 681. Duplex stoker distributor tube. 682. Duplex stoker distributor tube. 683. Duplex stoker distributor tube. 684. Duplex stoker distributor tube. 685. Duplex stoker distributor tube. 686. Duplex stoker distributor tube. 687. Duplex stoker distributor tube. 688. Duplex stoker distributor tube. 689. Duplex stoker distributor tube. 690. Duplex stoker distributor tube. 691. Duplex stoker distributor tube. 692. Duplex stoker distributor tube. 693. Duplex stoker distributor tube. 694. Duplex stoker distributor tube. 695. Duplex stoker distributor tube. 696. Duplex stoker distributor tube. 697. Duplex stoker distributor tube. 698. Duplex stoker distributor tube. 699. Duplex stoker distributor tube. 700. Duplex stoker distributor tube. 701. Duplex stoker distributor tube. 702. Duplex stoker distributor tube. 703. Duplex stoker distributor tube. 704. Duplex stoker distributor tube. 705. Duplex stoker distributor tube. 706. Duplex stoker distributor tube. 707. Duplex stoker distributor tube. 708. Duplex stoker distributor tube. 709. Duplex stoker distributor tube. 710. Duplex stoker distributor tube. 711. Duplex stoker distributor tube. 712. Duplex stoker distributor tube. 713. Duplex stoker distributor tube. 714. Duplex stoker distributor tube. 715. Duplex stoker distributor tube. 716. Duplex stoker distributor tube. 717. Duplex stoker distributor tube. 718. Duplex stoker distributor tube. 719. Duplex stoker distributor tube. 720. Duplex stoker distributor tube. 721. Duplex stoker distributor tube. 722. Duplex stoker distributor tube. 723. Duplex stoker distributor tube. 724. Duplex stoker distributor tube. 725. Duplex stoker distributor tube. 726. Duplex stoker distributor tube. 727. Duplex stoker distributor tube. 728. Duplex stoker distributor tube. 729. Duplex stoker distributor tube. 730. Duplex stoker distributor tube. 731. Duplex stoker distributor tube. 732. Duplex stoker distributor tube. 733. Duplex stoker distributor tube. 734. Duplex stoker distributor tube. 735. Duplex stoker distributor tube. 736. Duplex stoker distributor tube. 737. Duplex stoker distributor tube. 738. Duplex stoker distributor tube. 739. Duplex stoker distributor tube. 740. Duplex stoker distributor tube. 741. Duplex stoker distributor tube. 742. Duplex stoker distributor tube. 743. Duplex stoker distributor tube. 744. Duplex stoker distributor tube. 745. Duplex stoker distributor tube. 746. Duplex stoker distributor tube. 747. Duplex stoker distributor tube. 748. Duplex stoker distributor tube. 749. Duplex stoker distributor tube. 750. Duplex stoker distributor tube. 751. Duplex stoker distributor tube. 752. Duplex



COURTESY OF THE ANGUS SINCLAIR COMPANY

PACIFIC OR 4-6-2 TYPE LOCOMOTIVE—BOILER AND DRIVE WHEEL DETAILS

Running board. 160. Baker valve gear reverse yoke pivot pin. 161. Baker valve gear (see Plate IX.). 162. Driver spring stirrup. 171-172. Driver brake rod and hanger. 174. Driving wheel spoke. 175. Driving wheel tyre. 176. Baker valve gear eccentric rod. 177. Front driving axle journal bearing. 178. Front driving axle. 181. Connecting or main rod. 182. Front section of side or parallel rod. 184. Baker valve gear reverse yoke. 185. Reach rod carrying arm. 186. Valve gear counterbalance spring case. 187. Baker gear frame bracket. 188. Frame brace. 189. Driver spring hanger. 190. Driver brake lever. 191. Main driver spring. 192. Driver spring hanger step. 193. Main driver counterbalance. 194. Driving wheel and axle key. 195. Main driving axle. 196. Main driving axle hub. 197. Baker valve gear eccentric crank. 198. Main crank pin. 199. Reach rod. 200. Main driver spring hanger seat. 201. Frame brace. 202. Top of main frame. 203. Equalizer bracket. 204. Driver equalizer. 205. Lower rail of main frame. 206. Rear section of side of parallel rod. 207. Knuckle pin side rod. 208. Connecting rod fork. 209. Connecting rod cotter for brasses. 210. Connecting rod key for brasses. 211. Connecting rod oil cup. 212. Eccentric crank clamp. 213. Eccentric rod crank pin. 214-231. Ragonnet power reverse gear details. 232. Rear driving axle spring. 233-234. Driving axle spring and stirrup. 235. Franklin automatic driving box. 236. Franklin automatic driving box adjusting wedge. 237. Rear driving axle journal bearing. 238. Driving axle journal box. 239. Rear side rod flange. 240-242. Franklin automatic adjustable driving box wedge spring bracket, bolt and spring. 243. Driving wheel crank pin. 244. Franklin automatic adjustable driving box wedge spring cap. 245. Rear driving axle. 246-247. Driver brake beam, shoes and lever. 249-250. Foundation ring bearing shoe and support. 251. (see Plate VII.) 300. Dry pipe—runs from steam to cylinders (see Plate IX.). 306. Sand box cap. 308. Sellers injector check. 309. Delivery pipe. 310. Superheater unit support. 311-312. Sand pipe and sand box. 313-314. Sand lever and sand pipe connection. 315. Sand box rod. 316. Westinghouse air pump low pressure air cylinder lubricator. 317. Westinghouse air pump pressure air cylinder lubricator. 318-350. Westinghouse air pump details. 352. Second course of boiler shell. 353. Dome reinforcing plate. 354. Dome. Front anchor for back head brace. 356. Hand rail. 357. Dome casing. 358-365. Chamber throttle valve. 366. Air pipe from duplex compressor governor to compressor. 368. Steam valve body of duplex compressor governor. 369. Steam pipe to compressor. 370. Chamber throttle valve throttle rod. 371-373. Whistle, whistle rod and whistle lever. 374. Check unit for maximum pressure head of duplex compressor governor. 375. Check unit for excess pressure head of duplex compressor governor. 376. Spring box for maximum pressure head of duplex compressor governor. 377. Diaphragm body for duplex compressor governor. 378. Siamese fitting for duplex compressor governor. 379. Pipe from excess pressure of duplex compressor governor to automatic brake valve. 380. Safety valve. 382-384. Chambers throttle valve balance valve, piston and packing ring. 385. Superheater forged return bend. 386. Ragonnet reverse gear valve chest gland. 387. Beading on tubes. 388. Ash-tube wash-out plug. 389. Outside sheet. 391. Back tube sheet. 392. Crown sheet. 393. Stiffening plate for safety valve opening. 394. Outside sheet of fire box. 395. Boiler. 418. Combustion chamber. 419. Wash-out plug. 506. Side rod oil cup. 516. Front driving wheel crank. 517. Front driving wheel counter balance. Baker valve gear counter balance rod and arm. 520. Main reservoir. 521. Driver spring hanger key. 523. Westinghouse compound air pump. 524. Westinghouse air pump high pressure air piston. 527. Belpaire cross stay



COURTESY OF THE ANGUS SINCLAIR COMPANY

PACIFIC OR 4-6-2 TYPE LOCOMOTIVE—CYLINDER AND SMOKEBOX DETAILS

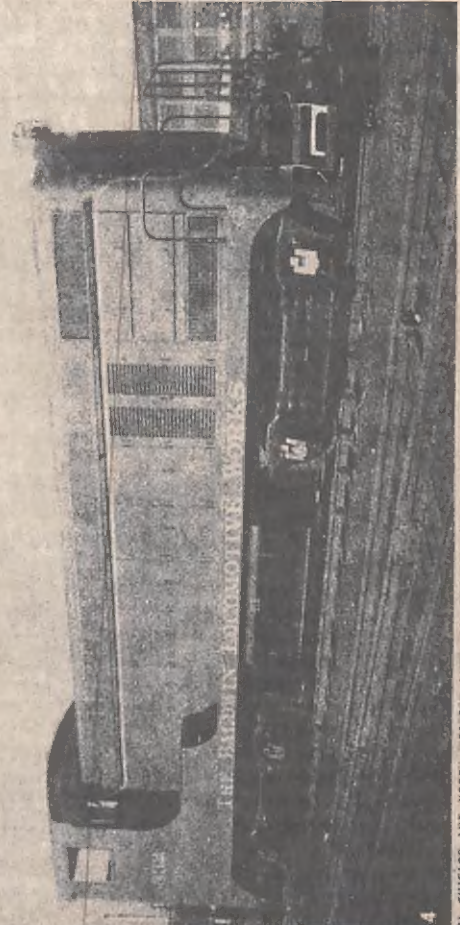
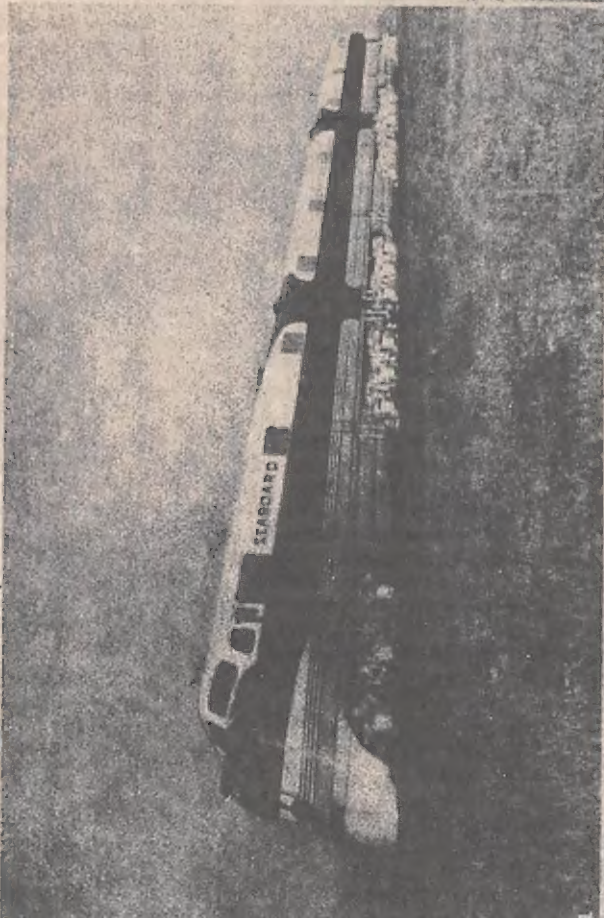
9. Coupler and uncoupling lever details. 9. Front end step. 10-12. Pilot nosing, base and bar. 13. Coupler knuckle pin. 14. Pilot brace. 15. Safety chain eye. 16. Snow flanger equalizer (Ray type). 17. Pilot and buffer angle. 18. Back vertical of pilot. 19-20. Pilot step bracket trend. 21. Pilot base tie bolt. 22-24. Truck flanger details (Ray type). 25. Truck pedestal. 26. Truck wheel. 27. Truck axle box collar. 28. Truck axle. 29. Truck axle journal bearing. 30. Truck axle box. 31. Truck pedestal rib. 32. Truck frame. 33-34. Extension piston rod casing and rod. 35. Pedestal tiebar bolt. 36. Truck pedestal bolt. 37. Truck pedestal tiebar cross tie. 38. Truck brakeshoe. 39. Truck brakehead. 40. Truck brake lever. 41. Front truck equalizer. 42. Cylinder cock slide rod. 43. Truck spring hanger and bracket. 44. Truck spring flange. 45. Cylinder head. 46. Cylinder shell. 47. Front cylinder head. 48-49. Front cylinder head casing and flange. 50. Extension piston rod packing. 51-52. Front truck semi-elliptic spring and band. 53-54. Piston rod and piston. 55. Steam port. 56. Piston packing ring. 57. Front plate stiffening angle and front plate. 59. Front buffer beam. 60-63. Lubricator details (Schlaacks system). 64. Front steam chest ceiling. 65. Front front bolt. 66. Boiler front. 67. Boiler front hand rail. 68-69. Smoke-box door clamp and door. 70-72. Flagstaff fixture, flagstaff and signal flag. 73. Flagstaff pin. 74. Flagstaff bracket. 75. Flagstaff nut. 76. Smoke-box door clamp bolt. 77. Cylinder. 78. Piston nut. 79. Truck pedestal tiebar. 80-81. Numbering. 82-85. Head-light bracket, lamp, reflector and casing (Pyle National). 86. Front smoke-box ring. 87. Netting frame. 88. Smoke-box door. 89. Smokestack. 90-91. Steam-pipe ring and flange. 92. Superheater steam-pipe connection. 93. Saturated steam passage. 94. Superheater steam-pipe stiffening ring. 95. Superheater head (type A). 96. Superheater unit ball end. 97. Superheater unit clamp. 98. Dry pipe flange. 99. Superheater header ring. 100. Superheater header. 101. Front tube sheet. 102. Smokestack lift pipe. 103-104. Netting stud and netting. 105. Diaphragm. 106-113. Superheater details. 114. Steam pipe. 115. Exhaust nozzle. 116-117. Exhaust pipe and passage. 118. Horizontal diaphragm pocket. 119. Lubricator terminal check valve (Schlaacks system). 120. Lubricator terminal check valve steam pipe extension (Schlaacks system). 121. Intermediate smoke pipe. 122-123. Steam chest casing and bushing. 124-125. Piston valve packing and bull ring. 126. Steam chest. 127-128. Piston valve and valve stem. 129. Piston rod. 130. Piston rod packing (Q. and C. type). 131. Piston rod lubricator (Q. and C. type). 132. Front steam chest head. 133. Superheater head. 134. Lubricator lever link (Schlaacks system). 135. Valve stem lubricator. 136. Cylinder cock reach rod. 137. Valve stem cross head guide. 138. Brake pull rod turn buckle. 139. Back steam chest head stud. 140. Driving brake cylinder. 141. Baker valve gear combination lever. 143-144. Top and bottom. 145. Cylinder cock shaft. 146. Driver and truck equalizer. 147. Cylinder cock. 148. Cylinder cock shaft arm. 149. Truck wheel web. 150. Driver and truck. 151. Baker gear valve rod. 152. Cross head. 153. Baker valve gear union rod. 154. Wrist or cross-head pin. 155-157. Baker valve gear frame, cross head and bell crank. 158. Front driver spring. 159. Baker valve gear radius bar. 163. Guide yoke. 164. Front driving spring hanger. 165. Guide strap. 166. Driver and truck. 167. Front pedestal leg. 168. Pedestal tie. 169. Brake pull rod adjusting nut. 170. Truck wheel flange. 173. Driver tire retaining ring. 180. Driver and truck. 183. Brake pull rod turn buckle. 289. Smokestack base reinforcing plate. 290-291. Boiler lagging and boiler jacket. 292. Hammett bell-ringer. 293. Bell. 294-295. Hammett bell-ringer piston rod and bell-ringer cylinder. 296-297. Bell stand and bell yoke. 298-299. Bell lever and bell cord. 300. Driver and truck. 301. Handrail bracket. 302. Superheater tube. 303. Superheater unit band. 304. Boiler tube or flue. 305. Boiler belly brace. 307. Sellers injector. 308. Driver and truck. 311. Front course of boiler shell. 381. Snow flanger cross tie brace (Ray type). 438-439. Driving brake cylinder head and piston rod. 507. Driver and truck. 511. Smokebox. 512. Superheater damper counter weight arm. 513. Truck wheel rim. 514. Truck wheel flange. 515. Pedestal tie bolts.



BY COURTESY OF (1-3) THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, (4) THE PENNSYLVANIA RAILROAD, (5) THE GENERAL ELECTRIC COMPANY, (6) THE CANADIAN NATIONAL RAILWAYS, (7) THE ELECTRIC STORAGE BATTERY COMPANY

ELECTRIC PASSENGER AND FREIGHT LOCOMOTIVES IN USE ON AMERICAN RAILROADS

1. Virginian Railway. Three 2-8-2 units, AAR Classification 3 (1-D-1), built by American Loco. Co., & Westinghouse Elec. and Mfg. Co.; 11,000 or 22,000 volts A.C. Total wt. 1,282,380 lb.; wt. on drivers 922,580 lb.; wt. on guiding trucks 359,800 lb.; capacity at one hr. rating 6,090 h.p. at 14.1 m.p.h.; 7,125 h.p. at 28.3 m.p.h. Starting tractive effort 277,500 lb. at 30.07% adhesion; tractive effort, hourly rating, 162,000 lb. at 14.1 m.p.h.; 94,500 lb. at 28.3 m.p.h.; tractive effort continuous rating, 135,000 lb. at 14.2 m.p.h.
2. Chicago, Milwaukee, St. Paul & Pacific Railroad. One 4-6-2 and one 2-6-4 articulated units, built by Westinghouse Elec. & Mfg. Co.; 300 tons cap.; 3,000 volts D.C. Total wt. of locomotive 600,000 lb.; wt. on drivers 378,000 lb.; wt. on idle trucks 222,000 lb.; capacity at one hr. rating 4,680 h.p. Starting tractive effort 94,500 lb.; tractive effort, hourly rating, 66,000 lb.; tractive effort, continuous rating, 40,800 lb.
3. New York, New Haven & Hartford Railroad. Two 2-6-2 articulated units, built by Westinghouse Elec. & Mfg. Co.; 11,000 volts A.C. Total wt. of locomotive 356,000 lb.; wt. on drivers 240,000 lb.; wt. on idle trucks 116,000 lb.; capacity at one hr. rating 2,508 h.p. Starting tractive effort 52,500 lb.; tractive effort, hourly rating, 19,260 lb.; continuous rating, 13,080 lb.
4. Pennsylvania Railroad. One articulated unit (4-6-0 + 0-6-4) built by the Pennsylvania Railroad. 11,000 volt A.C. Total weight of locomotive 460,000 lb.; weight on drivers 300,000 lb.; weight on idle trucks 160,000 lb.; capacity at continuous rating 4,620 h.p. Starting tractive effort 72,800 lb.; tractive effort, continuous rating (90 miles per hour) 19,140 lb.
5. Chicago, Milwaukee, St. Paul & Pacific Railroad. Two 2-8-0 articulated units, built by General Elec. Co.; 3,000 volts D.C. Total wt. of locomotive 564,000 lb.; wt. on drivers 348,000 lb.; wt. on idle trucks 116,000 lb. Starting tractive effort 100,000 lb.; tractive effort, hourly rating, 71,000 lb.
6. Canadian National Railways. Two 4-wheel type oil-electric passenger and baggage motor car, built by Pointe-à-la-Paix Works, Montreal. Length of car body 73 ft. 9 in.; axle ends 11 ft.; total wt. on rails 133,000 lb. Beardmore six-cylinder engine, 300 h.p. at 750 r.p.m. Westinghouse 198 K.W. D.C. generator, 600 volt 200 h.p. motor.
7. New York Central Railroad. Two 4-wheel truck type, built by Electric Storage Battery Co. Combination battery and oil-electric; 218-cell storage battery, capacity, 29,000 amp-hr.; four motors, total rated 1,500 h.p.; motor gear ratio, 2.2:1; wheels 44 in. diam. Tractive effort, max. 60,000 lb.; on drivers 257,000 lb.; 300 h.p.



BY COURTESY OF (1) ELECTRO-NOTICE CORPORATION, (2) AMERICAN LOCOMOTIVE COMPANY AND GENERAL ELECTRIC COMPANY, (3) CHICAGO AND NORTH WESTERN LINE, (4) THE BALDWIN LOCOMOTIVE WORKS

OIL-ELECTRIC LOCOMOTIVES FOR PASSENGER AND FREIGHT SERVICE

1. Three-unit diesel-electric locomotive for passenger train service. This streamlined locomotive develops a total of 6,000 horse-power.
2. Also O.E. diesel-electric 650-h.p. switching locomotive.
3. Diesel-electric locomotive of two units that draws a streamlined passenger train, "The 400," between Chicago and Minneapolis.
4. Diesel-electric switching locomotive 1,000-h.p. for freight service.

SWIVEL TRUCK

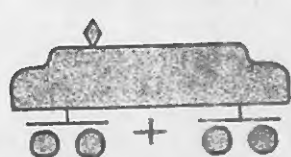


B-B (0-4-4-0)

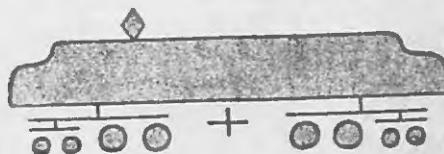


C-C (0-6-6-0)

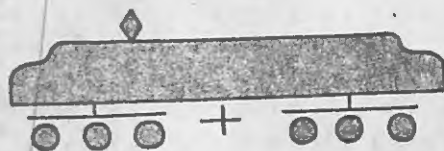
ARTICULATED TRUCK



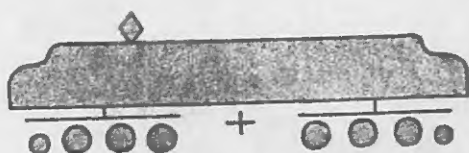
B+B (0-4-4-0)



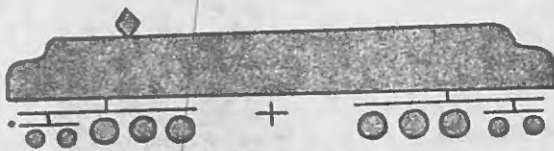
2B+B2 (4-4-4-4)



C+C (0-6-6-0)



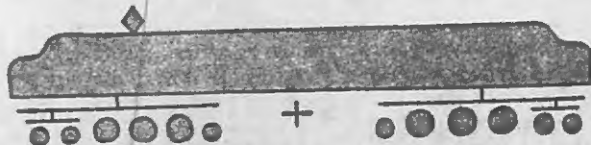
1C+C1 (2-6-6-2)



2C+C2 (4-6-6-4)



1C1+1C1 (2-6-2+2-6-2)

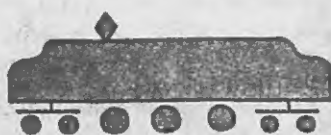


2C1+1C2 (4-6-2+2-6-4)

RIGID FRAME



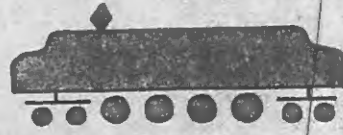
C (0-6-0)



2C2 (4-6-4)



1D1 (2-8-2)



2D2 (4-8-4)

TYPES OF ELECTRIC LOCOMOTIVE MECHANICAL DESIGN

to meet normal curve restrictions with more than four driving axles in the rigid wheel base. Thus, where large capacities are required, this type is restricted to those railroads which will permit relatively heavy axle loadings.

The articulated type has the widest possible field of application. Since it is practical to provide six to eight driving axles, this type offers the designer a wide variety of choices to meet any particular requirements.

The design of the guiding trucks is influenced largely by the prevailing speeds at which the locomotive will be called upon to operate. Single axle trucks are generally preferred for medium speeds, but above 60 m.p.h., two-axle trucks predominate. To perform effectively their function in guiding, the weight carried by each guiding axle must be from 50% to 80% of the weight carried by each driving axle. The design of the guiding trucks is a most important feature for very high speed operation. By proper design of its mechanical parts, the electric locomotive can be made safe for operation at any speeds permitted by the roadbed.

Drive.—One feature of the electric locomotive which has received much attention is the "drive," or the arrangement by which the motor torque is transmitted to the driving wheels. All loco-

motive drives may be classified into two general types: (a) the individual axle drive where each axle is driven by its own motor, and (b) the collective drive where two or more axles are driven from one motor or group of motors. While the collective drive is somewhat the outgrowth of steam practice, both have been widely used, although more recently, especially in America, the individual axle drive has greatly predominated and eliminates side rods and heavy rotating parts.

The simplest form of individual axle drive is the direct axle hung motor. Here the motor is mounted within the truck, geared directly to the axle to be driven. The motor is supported on one side by bearings on the axle, and on the opposite side by a nose support which rests on some portion of the truck frame. The field of application of this drive is somewhat restricted by limitations, but for those cases where it is suitable it is used because of low cost and low maintenance expense.

When the service to which the locomotive is to be applied requires for large capacity motors operating at high speeds, experience has proven the desirability of carrying the motors on frame borne parts of the running gear to relieve the track of unsprung weight. When this mounting is used, the

U. A. 11. 11.
LOCOMOTIVE. This article deals with the three types of locomotives used in railway transportation: (1) self-contained and self-propelled high pressure steam, (2) internal combustion and (3) electric locomotives dependent upon an outside source of power. See also **Boilers; Steam Generation; Railways; Traction; Electric** and various other articles under specific headings.

Encyclopedia Britannica

p. 278